CLAIMS

1. A method for detecting a target double stranded DNA, which comprises the steps of:

- hybridizing the target double stranded DNA with a single stranded PNA (peptide nucleic acid) which is complementary to the whole or a part of the target DNA; and
- measuring the degree of hybridization at the presence of a denaturing agent.

2. A method according to claim 1, which further comprises, prior to the hybridization step, the step of amplifying a target nucleotide sequence by PCR to obtain the double stranded DNA.

3. A method according to claim 1, wherein the measuring step is carried out by using a surface plasmon resonance biosensor.

4. A method according to claim 3, wherein the single stranded PNA is immobilized on a measuring chip of the surface plasmon resonance biosensor.

5. A method according to claim 1, wherein the measuring step is carried out at a temperature not exceeding 40°C.

6. A method according to claim 1, wherein the denaturing agent is formamide.

7. A method according to claim 1, wherein two or more target double stranded DNA are detected.

8. A method according to claim 1, wherein the target double stranded DNA is obtained by amplifying a DNA selected from the group consisting of genome DNAs of Escherichia coli O-157, Vibrio parahaemolyticus, and Salmonella.

9. A method for detecting Escherichia coli O-157, which comprises the steps of:

- amplifying a genome DNA of Escherichia coli O-157 by PCR to obtain a double stranded DNA;
- hybridizing the double stranded DNA with a single stranded PNA which has the same sequence as at least 15 consecutive nucleotides of the nucleotide sequence of SEQ ID NO: 1; and
- measuring the degree of hybridization at the presence of a denaturing agent.

10. A method according to claim 9, wherein the amplifying step is carried out by using a sense primer selected from SEQ ID NOS. 4, 5, 7, 8, and 9 and an antisense primer of SEQ ID NO.6.

11. A method according to claim 9, wherein the single stranded PNA is selected from the group consisting of the sequences of SEQ ID NOS:2, 16, and 17 and a complementary sequence thereof.

12. A method according to claim 9, wherein the measuring step is carried out by using a surface plasmon resonance biosensor.

13. A method according to claim 12, wherein the single stranded PNA is immobilized on a measuring chip of the surface plasmon resonance biosensor.

14. A method according to claim 9, wherein the measuring step is carried out at a temperature not exceeding 40°C.

15. A method for detecting Escherichia coli O-157, which comprises the steps of:

- amplifying a genome DNA of Escherichia coli O-157 by PCR to obtain a double stranded DNA by using a sense primer selected from SEQ ID NOS. 4, 5, 7, 8, and 9 and an antisense primer of SEQ ID NO.6;
- hybridizing the double stranded DNA with a single stranded PNA selected from the group consisting of the sequences of SEQ ID

NOS:2, 16, and 17 and a complementary sequence thereof; and

- measuring the degree of hybridization by using a surface plasmon resonance biosensor at the presence of a denaturing agent at a temperature not exceeding 40°C.

16. A method according to claim 15, wherein the single stranded PNA is immobilized on a measuring chip of the surface plasmon resonance biosensor.

17. An apparatus for detecting Escherichia coli O-157, comprising

- a surface plasmon resonance biosensor;
- a measuring chip for the surface plasmon resonance biosensor; and
- a single stranded PNA selected from the group consisting of the sequences of SEQ ID NOS:2, 16, and 17 and a complementary sequence thereof, which is immobilised on a surface of the measuring chip.

18. An apparatus according to claim 17, which further comprises

- a sense primer selected from SEQ ID NOS. 4, 5, 7, 8, and 9; and
- an antisense primer of SEQ ID NO.6.

19. An apparatus according to claim 18, wherein a sample DNA is amplified by using the sense primer and the antisense primer by PCR to obtain a double stranded DNA and wherein the degree of hybridization between the double stranded DNA and the single stranded PNA is then measured at the presence of a denaturing agent at a temperature not exceeding 40°C.

20. An apparatus according to claim 17, wherein the denaturing agent is formamide.